## **CLAIMS**

- [1] A phosphorus-containing silazane composition comprising a polyalkylsilazane and at least one phosphorus compound in an organic solvent.
- [2] The composition according to claim 1, wherein said phosphorus compound is selected from the group consisting of phosphoric esters and phosphazene compounds.
- [3] The composition according to claim 1, wherein said phosphorus compound is tris(trimethylsilyl)phosphate.
- [4] The composition according to any one of claims 1 to 3, wherein said phosphorus compound is contained in an amount of 5 to 100% by mass based on said polyalkylsilazane.
- [5] The composition according to any one of claims 1 to 4, wherein said polyalkylsilazane comprises repeating units represented by general formula (1) and at least one type of units represented by general formula (2) or general formula (3) and has a number average molecular weight of 100 to 50,000:

$$-(SiR^{1}(NR^{2})_{1.5})-(1)$$

wherein  $R^1$  and  $R^2$  each independently represent a hydrogen atom or an alkyl group having 1 to 3 carbon atoms, excluding the case where  $R^1$  and  $R^2$  simultaneously represent a hydrogen atom;

[Chemical formula 1]

$$\begin{array}{c}
R^3 \\
+ Si - N \\
R^4 R^5
\end{array}$$
(2)

wherein  $R^3$ ,  $R^4$  and  $R^5$  each independently represent a hydrogen atom or an alkyl group having 1 to 3 carbon atoms, excluding the case where  $R^3$  and  $R^4$  simultaneously represent a hydrogen atom;

[Chemical formula 2]

$$-\frac{\begin{pmatrix} R^6 & R^7 \\ N-S & R^8 \end{pmatrix}}{\begin{pmatrix} R^9 & R^9 \end{pmatrix}}$$
 (3)

wherein  $R^6$  to  $R^9$  each independently represent a hydrogen atom or an alkyl group having 1 to 3 carbon atoms, excluding the case where all of  $R^7$ ,  $R^8$ , and  $R^9$  represent a hydrogen atom.

- [6] The composition according to claim 5, wherein, in general formula (1), R<sup>1</sup> represents a methyl group and R<sup>2</sup> represents a hydrogen atom; in general formula (2), R<sup>3</sup> and R<sup>4</sup> represent a hydrogen atom or a methyl group and R<sup>5</sup> represents a hydrogen atom; and, in general formula (3), R<sup>7</sup>, R<sup>8</sup> and R<sup>9</sup> represent a methyl group and R<sup>6</sup> represents a hydrogen atom.
- [7] The composition according to claim 5 or 6, wherein said polyalkylsilazane comprises not less than 50%, based on the total number of units represented by general formulae (1), (2) and (3), of repeating units represented by general formula (1).
- [8] A phosphorus-containing siliceous film comprising 0.5 to 10 atomic% of phosphorus and being produced by baking a film of a composition according to any one of claims 1 to 7.
- [9] The phosphorus-containing siliceous film according to claim 8, wherein the specific permittivity is not more than 3.5.
- [10] A phosphorus-containing siliceous filler comprising 0.5 to 10 atomic% of phosphorus and being produced by filling a film of a composition according to any one of claims 1 to 7 into grooves, in which the width of the deepest part is not more than 0.2  $\mu m$  and the ratio of the depth to the width is not less than 2, and baking the film.
- [11] A process for producing a phosphorus-containing siliceous film comprising coating a composition according to any one of claims 1 to 7 onto a substrate to form a film which is then prebaked at a temperature of 50 to 300°C and

- is then baked in an inert atmosphere at a temperature of  $300 \text{ to } 700^{\circ}\text{C}$ .
- [12] A semiconductor device comprising a phosphoruscontaining siliceous film according to claim 8 as an interlayer insulation film.